

Trend Study 2-20-01

Study site name: Richmond WMA.

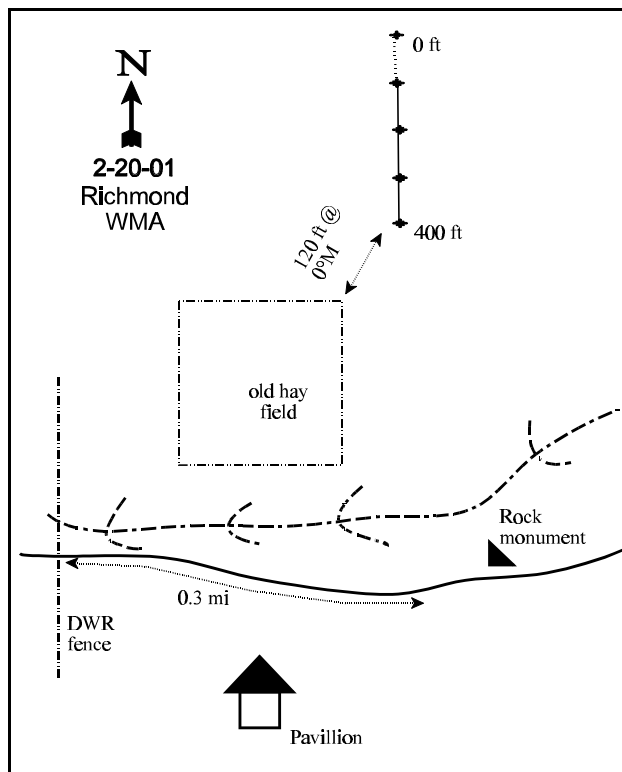
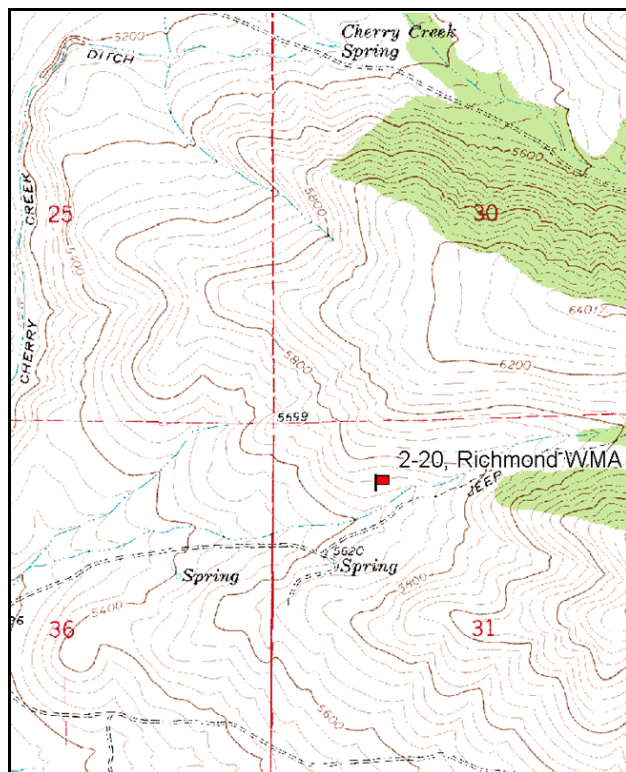
Vegetation type: Bitterbrush.

Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection of 250 East and 400 South in Richmond, go 0.2 miles south on 250 East and turn left between a house and a hayfield. Go east 0.6 miles to a fork, keep left. Go 0.7 miles to a gate at the DWR property boundary. If the road is still passable, continue 0.3 miles up the drainage to the end of the road. There is an old fork, and a rock monument. From the rock pile, walk in a northwest direction to the hayfield. From the northeast corner of the fence surrounding the hayfield, walk 120 feet at 0 degrees magnetic to the 400-foot baseline stake. The study stakes run southerly at 180 degree magnetic from the 0-foot baseline stake. The site is on a bitterbrush transplant area.



Map Name: Richmond

Diagrammatic Sketch

Township 14N, Range 2E, Section 31

UTM 4640517 N, 435975 E

DISCUSSION

Trend study No. 2-20

The Richmond Wildlife Management Area trend study was established to monitor the success of a 1990 bitterbrush transplant on the Richmond WMA, and to replace a nearby study which was on private land. The site is located on a moderate (20-25%) slope that faces to the south. Elevation is about 6,000 feet. Five thousand bitterbrush seedlings were planted in March of 1990, shortly after the snow had melted from the site. Rains in April were beneficial to establishment. On June 26, 1990, a majority of the transplanted bitterbrush seedlings were classified as having good vigor. Dry and dead transplants were also encountered. Currently, the site is dominated by annual grasses and some perennial forbs and grass. The bitterbrush had not been utilized in 1990 or 1996. No deer sign was observed on the site. A pellet group transect read in 2001 estimated less than 1 deer and 3 elk days use/acre (2 ddu/ha and 8 edu/ha). There were no cattle on the site when it was monitored in 2001, but a few cattle pats were encountered.

The soil is moderately deep with an estimated effective rooting depth (see methods) of nearly 15 inches. Parent material is limestone and soil texture is a clay loam. There is little rock on the surface or in the profile, yet the soil temperature was still relatively high at 69° F at a depth of 16 inches. This high of a temperature would be due to the slope and aspect of the site. There is a high percentage of vegetation and litter cover, mostly because of the abundance of annual species, primarily annual bromes. Bare soil was estimated at 31% in 1990. This was mostly related to the disturbed spots where the bitterbrush had been planted. Percent bare ground was estimated at only 3% in 1996, increasing to 19% in 2001. The erosion condition class was determined to be stable in 2001. There is little erosion occurring on the site due to abundant vegetation and litter cover.

There was little browse on the site before the transplant took place, although a few mountain big sagebrush were present. Since 1996, sagebrush density increased from 20 plants/acre to 100 plants/acre in 2001. The density of transplanted bitterbrush was estimated to be 466 seedlings/acre in 1990. Vigor was normal. During the 1996 reading, only one mature bitterbrush plant was encountered in the shrub density strips. This is probably indicative of the dry conditions that have persisted since 1990, combined with the intense competition with annual grasses and forbs. Estimated density was only 20 plants/acre. Utilization was light and vigor good. During the 2001 reading, density remains at an estimated 20 plants/acre, represented by a single mature shrub. It was vigorous and had an average annual leader growth of 4 inches. Average height of the bitterbrush has increased from 19 inches to 41 inches.

The herbaceous understory is very dense, likely one of the reasons why the bitterbrush transplants were not successful. The grass component is dominated by Japanese brome and cheatgrass which accounted for 99% of the grass cover in 1996 and 85% in 2001. Perennial grasses are represented by small numbers of bluebunch wheatgrass, prairie Junegrass, Kentucky bluegrass, and Sandberg bluegrass.

Forbs are diverse and productive, although they include several annual and perennial weeds. These weeds include pacific aster, willow weed, curlycup gumweed, one-flower helianthella, prickly lettuce, and yellow salsify. Cutleaf balsamroot produces over 50% of the forb cover and is the dominant forb on the site. Grasshoppers are abundant and appear to be utilizing the balsamroot leaves.

1990 APPARENT TREND ASSESSMENT

The success of the transplant depends to a large extent on weather conditions and the degree of competition with herbaceous species, although these impacts could be modified by management intervention (watering and weeding). Utilization by big game is more difficult to manage. Browse forage is limited in the area and would be a valuable addition to the winter range. If successful, it could be a good example for future projects. At this early stage, success of the treatment is difficult to predict. Based only on the initial data, the trend for winter range value is upward. Soil movement is negligible and the trend appears stable.

1996 TREND ASSESSMENT

Soil trend is up with a decline in percent bare ground from 31% to 3% and an increase in litter cover from 46% to 75%. Unfortunately the increase in litter cover is primarily from annual and biennial weeds which provide intense competition with the transplanted bitterbrush. The browse trend is down after the transplant. The post treatment density of 466 seedling bitterbrush has declined to only 20 mature plants/acre. There is not enough browse on the site to support wintering deer. The herbaceous trend is also down. Sum of nested frequency for perennial grasses has declined by 82%. Annual grasses were not included in the 1990 sample, but they currently dominate the grass component by providing 99% of the grass cover. It appears that perennial grasses could soon be eliminated on the site due to competition with annuals. Sum of nested frequency for perennial forbs have increased slightly since 1990 due to significant increases in the sum of nested frequencies for prickly lettuce, pacific aster, and yellow salsify, all of which are weedy increasers. It will be practically impossible to get browse seedlings or transplants to become establish without controlling the abundant weedy herbaceous understory.

TREND ASSESSMENT

soil - up (5)

browse - down with few transplants surviving to become mature plants (1)

herbaceous understory - down and dominated by annuals (1)

2001 TREND ASSESSMENT

Trend for soil is down slightly due to an increase in bare ground and a decline in litter cover. As a result, the proportion of protective cover to bare soil has declined by 52%. However, erosion is not a problem and the erosion condition class was determined to be stable. Trend for browse is up slightly, although the shrubs are still in very low numbers. Estimated population density of mountain big sagebrush has increased from 20 plants/acre in 1996 to 100 plants/acre in 2001. In addition, there are abundant sagebrush seedlings and young. Density of the transplanted bitterbrush has remained low at only 20 plants/acre. Use is mostly light and vigor good on all shrubs sampled. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency for perennial grasses. The grass composition is still dominated by Japanese brome and cheatgrass which account for 84% of the grass cover. However, nested frequency of bluebunch wheatgrass and Sandberg bluegrass increased significantly. Frequency of perennial forbs increased slightly but most of these are weeds. The draw to the south of the site is totally dominated by wyethia and tarweed.

TREND ASSESSMENT

soil - down slightly (2)

browse - up slightly but still depleted (4)

herbaceous understory - up slightly, but still dominated by annuals (4)

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 20

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
G	Agropyron spicatum	ab20	a12	b33	9	4	15	.19	.84
G	Bromus brizaeformis (a)	-	a-	b28	-	-	12	-	.21
G	Bromus japonicus (a)	-	b364	a297	-	97	92	22.11	8.81
G	Bromus tectorum (a)	-	a108	b194	-	35	61	2.23	6.25
G	Koeleria cristata	-	-	-	-	-	-	.00	-
G	Melica bulbosa	b15	a-	b11	7	-	5	-	.02
G	Phleum pratense	-	-	2	-	-	1	-	.03
G	Poa bulbosa	-	-	8	-	-	3	-	.07
G	Poa pratensis	b74	a4	a22	35	1	9	.03	.39
G	Poa secunda	a-	a4	b77	-	2	36	.03	1.28
Total for Annual Grasses		0	472	519	0	132	165	24.34	15.27
Total for Perennial Grasses		109	20	153	51	7	69	0.26	2.65
Total for Grasses		109	492	672	51	139	234	24.60	17.93
F	Achillea millefolium	3	3	1	1	1	1	.00	.03
F	Agoseris glauca	13	18	12	6	8	7	.14	.08
F	Alyssum alyssoides (a)	-	a95	b184	-	39	70	.24	1.82
F	Artemisia ludoviciana	2	2	4	1	1	1	.15	.15
F	Aster chilensis	a-	b21	c51	-	8	19	.28	1.33
F	Astragalus spp.	6	-	-	3	-	-	-	-
F	Balsamorhiza macrophylla	b169	a123	ab145	75	59	59	15.10	17.61
F	Collomia linearis (a)	-	3	5	-	1	2	.03	.01
F	Crepis acuminata	8	-	5	4	-	2	-	.06
F	Epilobium brachycarpum (a)	-	b232	a147	-	83	50	7.38	1.62
F	Erodium cicutarium (a)	-	15	8	-	7	3	.13	.09
F	Eriogonum umbellatum	a-	a-	b59	-	-	19	-	.36
F	Grindelia squarrosa	a-	b20	c52	-	9	25	.71	4.46
F	Hackelia patens	-	1	-	-	1	-	.03	-
F	Helianthella uniflora	a-	b26	ab10	-	12	4	1.45	1.06
F	Lappula occidentalis (a)	-	7	-	-	4	-	.05	-
F	Lactuca serriola	a20	b98	a53	12	41	25	1.05	1.10
F	Lithospermum ruderales	b7	ab3	a-	5	1	-	.06	-
F	Lomatium grayi	b120	a10	a26	53	4	23	.16	.56
F	Lupinus argenteus	b19	a-	a-	11	-	-	-	-
F	Madia glomerata (a)	-	-	4	-	-	2	-	.01

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'96	'01	'90	'96	'01	'96	'01
F	Microsteris gracilis (a)	-	-	8	-	-	2	-	.01
F	Navarretia intertexta (a)	-	4	-	-	2	-	.01	-
F	Penstemon spp.	-	-	4	-	-	1	-	.03
F	Phlox longifolia	-	2	-	-	1	-	.00	-
F	Polygonum douglasii (a)	-	18	-	-	8	-	.04	-
F	Tragopogon dubius	_a 3	_b 104	_a 8	1	48	5	1.28	.02
F	Veronica biloba (a)	-	_a 28	_b 138	-	12	52	.08	.85
F	Viola spp.	_b 10	_a -	_a -	7	-	-	-	-
F	Wyethia amplexicaulis	_a -	_{ab} 12	_b 15	-	4	5	.59	1.43
F	Zigadenus paniculatus	-	-	-	-	-	-	-	.00
Total for Annual Forbs		0	402	494	0	156	181	7.98	4.43
Total for Perennial Forbs		380	443	471	179	198	196	21.04	28.33
Total for Forbs		380	845	965	179	354	377	29.02	32.77

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 02 , Study no: 20

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	1	4	-	-
B	Purshia tridentata	1	1	.03	.38
B	Rosa woodsii	0	1	-	-
Total for Browse		2	6	0.03	0.37

BASIC COVER --

Herd unit 02 , Study no: 20

Cover Type	Nested Frequency		Average Cover %		
	'96	'01	'90	'96	'01
Vegetation	391	390	14.00	56.94	54.62
Rock	133	151	7.00	5.10	7.98
Pavement	51	197	1.75	.43	1.87
Litter	400	381	46.25	75.11	37.63
Cryptogams	-	1	0	0	.00
Bare Ground	131	263	31.00	2.84	19.07

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 20, Richmond WMA

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.7	69.2 (16.1)	7.0	24.6	40.4	35.0	2.8	39.5	329.6	.6

PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 20

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Horse	1	-	-	-
Elk	-	-	44	3 (8)
Deer	-	3	9	<1 (2)
Cattle	1	3	35	3 (7)

BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 20

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4					
Artemisia tridentata vaseyana																			
S	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	01	4	-	-	-	-	-	-	-	-	-	4	-	-	80		4		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	01	3	-	-	-	-	-	-	-	-	-	3	-	-	60		3		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0		
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	24		
	01	1	1	-	-	-	-	-	-	-	2	-	-	-	40	14	23		
% Plants Showing		<u>Moderate Use</u>					<u>Heavy Use</u>					<u>Poor Vigor</u>				<u>%Change</u>			
		'90					00%					00%							
		'96					00%					00%				+80%			
		'01					20%					00%							
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-				
												'96	20		-				
												'01	100		-				

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
S	90	13	-	-	1	-	-	-	-	-	13	-	-	1	466		14	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	1	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	41	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%										
'96		00%			00%			00%			+ 0%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	20		-			
												'01	20		-			
Rosa woodsii																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20	0	
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%										
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	0		-			
												'01	20		-			